## Appendix 1 – Impacts of Diversification on Risk

The following analysis, using data up to February 2019, demonstrates the potential benefits of a diversified approach in the stock markets. The analysis uses the S&P/TSX composite index as a proxy for the performance of the Canadian stock markets and the MSCI World index as a proxy for the performance of the Global stock markets in developed countries. The analysis assumes four different asset mixes (100% Canadian; 100% Global; a 75:25 Canadian to Global ratio; a 50:50 ratio; and a 25:75 Canadian to Global ratio) over three different time periods (10, 20, and 40 years). For each asset mix and time period, the analysis calculates total returns as an annualized percentage, and volatility[1] (a common risk measure) as an annualized percentage.

### *The 10-year time frame*

In the 10-year time frame, the 100% Canadian mix (S&P/TSX) experienced the lowest returns at the highest levels of risk. The 100% Global mix (MSCI World) experienced the highest returns and the second highest levels of risk. As expected, the three diversified asset mixes experienced returns somewhere between the two with greater returns showing for those with a heavier weighting of the Global index. However, all three diversified asset mixes experienced less volatility (risk) during the time-period with the 50:50 asset mix showing the least volatility. The 25:75 Canadian to Global mix yield the highest risk-adjusted return (return divided by risk) at 1.37. For the purposes of comparing to other time-periods, it should be noted that during this 10-year time frame the market did not experience any extreme economic events.

*Table 1: Risk and return of different equity mixes over a 10-year period*

| (Annualized percentages) | 100% Canadian | 100% Global | 75% Canadian / 25% Global | 50% Canadian / 50% Global | 25% Canadian / 75% Global |
|---|---|---|---|---|---|
| **Return** | 10.21 | 13.42 | 11.10 | 11.94 | 12.71 |
| **Volatility** | 10.77 | 10.08 | 9.66 | 9.13 | 9.28 |
| **Risk-adjusted return** | 0.95 | 1.33 | 1.15 | 1.31 | 1.37 |

### *The 20-year time frame*

In the 20-year time frame, the 100% Canadian mix experienced both the highest level of returns and the highest level of risk. The 100% Global mix experienced the lowest returns and was in the middle of the asset mixes in terms of risk. In terms of the diversified mixes those that favoured Canadian stocks offered greater returns but also greater levels of risk, whereas those that favoured Global stocks produced lower returns at a lower risk. During this period, the asset mixes that favoured Canadian stocks offered the greatest risk adjusted returns with the 75:25 Canadian to Global mix offering

[1] Volatility is measured by standard deviation throughout this document

a slightly higher risk adjusted return (0.541) than the 100% Canadian mix (0.538). It should be noted that this period covers the 2008 financial crisis, one of the most significant market collapses since the Great Depression. Additionally, the Global index incorporates US stocks, which were heavily impacted by the 2008 financial crisis.

*Table 2: Risk and return of different equity mixes over a 20-year period*

| (Annualized percentages) | 100% Canadian | 100% Global | 75% Canadian / 25% Global | 50% Canadian / 50% Global | 25% Canadian / 75% Global |
|---|---|---|---|---|---|
| **Return** | 7.37 | 4.25 | 6.70 | 5.96 | 5.14 |
| **Volatility** | 13.69 | 11.85 | 12.37 | 11.57 | 11.38 |
| **Risk-adjusted return** | 0.54 | 0.36 | 0.54 | 0.52 | 0.45 |

*The 40-year time frame*

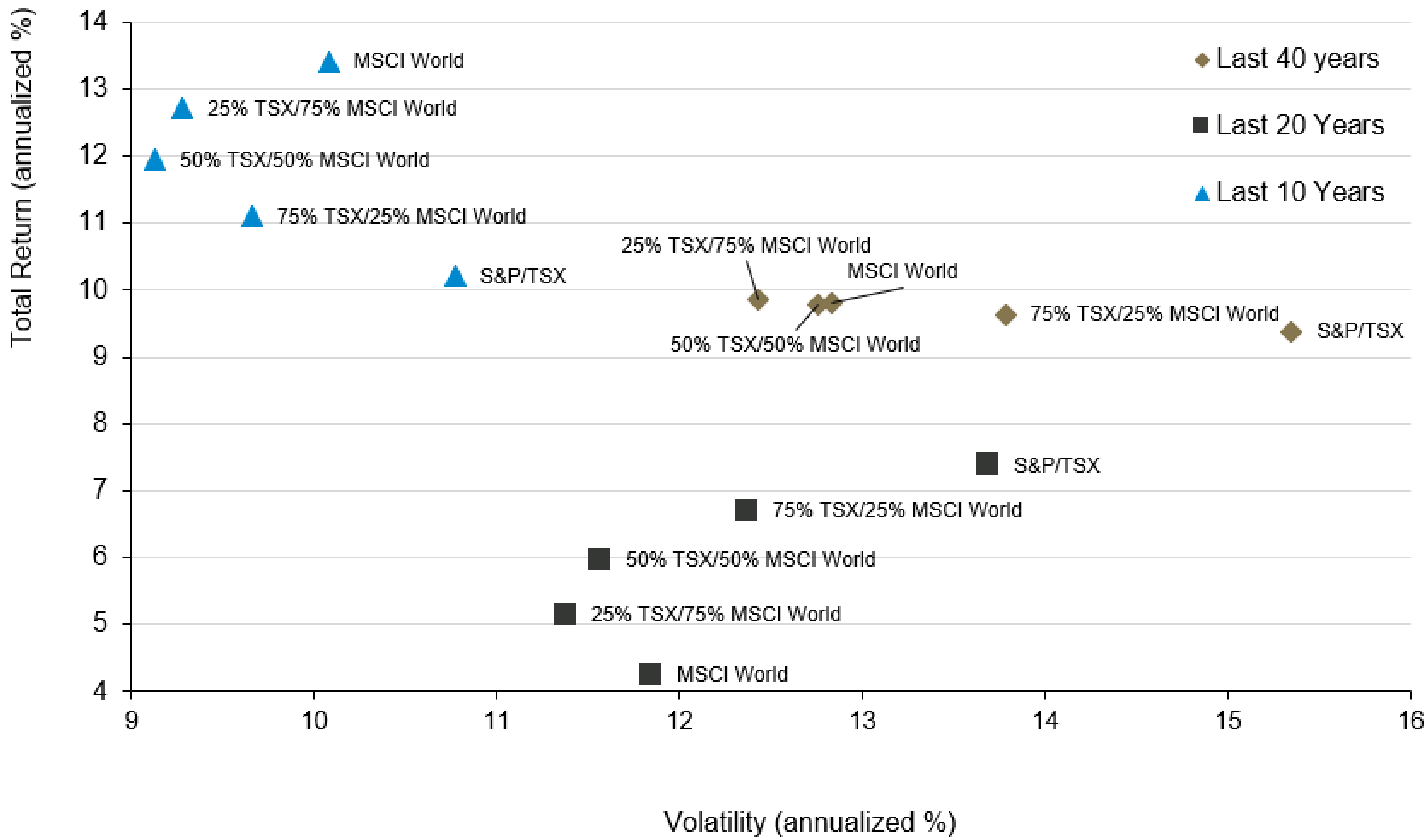
In the 40-year time frame, the 100% Canadian mix experienced the lowest returns and the highest levels of risk. The 100% Global mix experienced the second-highest level of returns and was in the middle of the asset mixes in terms of risk. Of the three diversified mixes the 25:75 Canadian to Global mix offered both the greatest returns and the lowest level of risk. The mixes that leaned more heavily on Global stocks offered greater returns and lower levels of risk. The diversified mixes that were weighted equally or more heavily toward Global stocks yielded greatest risk adjusted returns. In addition to the financial crisis in 2008, this period also encompasses the dot-com bubble of the mid 1990s to early 2000s, and the high interest rates in the 1980s and volatile oil prices of the 1970s and 80s.

*Table 3: Risk and return of different equity mixes over a 40-year period*

| (Annualized percentages) | 100% Canadian | 100% Global | 75% Canadian / 25% Global | 50% Canadian / 50% Global | 25% Canadian / 75% Global |
|---|---|---|---|---|---|
| **Return** | 9.38 | 9.80 | 9.64 | 9.79 | 9.85 |
| **Volatility** | 15.35 | 12.83 | 13.78 | 12.76 | 12.43 |
| **Risk-adjusted return** | 0.61 | 0.76 | 0.70 | 0.77 | 0.79 |

What we can see from this analysis is that, through each time period, Global diversification generally offered a lower level of risk than relying on Canadian stocks alone. Apart from the 20-year time period, Global diversification also delivered greater rates of return and risk-adjusted returns. The 20-year time period demonstrates that significant economic events in a market can have a noticeable impact on returns but that the level of diversification still offers a lower overall exposure to volatility.

**Performance by Asset Class**
(percent; CAD basis)




Source: Bloomberg, Guardian Capital